$=\sqrt{(28\frac{4}{7})^2-8^2}=27\frac{3}{7}$ miles. Now C's route forms with A's route a right triangle whose perpendicular is $27\frac{3}{7}$. The sum of the hypothenuse and base $=C$'s distance $=\frac{5}{3}$ of A's distance $=27\frac{3}{7}\times\frac{5}{3}=45\frac{5}{7}$ miles. Also, from Geometry, the difference between the hypothenuse and base $=(27\frac{3}{7})^2\div45\frac{5}{7}=16\frac{16}{35}$ miles.

$\therefore$ Base $=\frac{1}{2}(45\frac{5}{7}-16\frac{16}{35})=14\frac{22}{35}$ miles. C's time in base is therefore, $14\frac{22}{35}\div5=2\frac{162}{175}$ hours $=2$ hours 55 minutes $32\frac{4}{7}$ seconds.

42. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

If $m=2$ct. be the interest on $M=100$ct. for $p=40$ days, find the yearly rate per cent.

I. Solution by P. S. BERG, Apple Creek, Ohio.

$\frac{1}{9}$ cent $=$ the interest on 100 cents for 40 days at 1%.

$2\div\frac{1}{9}=18$. Hence, 18 is the yearly rate per cent.

II. Solution by COOPER D. SCHMITT, Professor of Mathematics, Vanderbilt University, Knoxville, Tennessee.

If m is the interest on M cents for p days, then $\dfrac{m}{p}$ is the interest on M cents for 1 day, and $\dfrac{360m}{p}$ is the interest on M cents for 360 days.

Hence the per cent will be $\dfrac{360m}{p}$ of $100=\dfrac{36000m}{Mp}$ %. If $m=2, p=40$, and $M=100$, the rate is $\dfrac{72000}{100\times40}=18\%$.

Solutions of this problem were received from Professors *Matz* and *Zerr*.

43. Proposed by B. F. BURLESON, Oneida Castle, New York.

A, in a scuffle, seized on $\frac{2}{3}$ of a parcel of sugar plums; B caught $\frac{3}{8}$ of it out of his hands, and C laid hold on $\frac{3}{10}$ more: D ran off with all A had left, except $\frac{1}{7}$ which E afterwards secured slyly for himself; then A and C jointly set upon B, who, in the conflict, let fall $\frac{1}{2}$ he had, which were equally picked up by D and E, who lay perdu. B then kicked down C's hat, and to work they all went anew, for what it contained; of which, A got $\frac{1}{4}$, B $\frac{1}{3}$, and D $\frac{2}{7}$, and C and E equal shares of what was left of that stock. D then stuck $\frac{3}{4}$ of what A and B last acquired, out of their hands; they, with difficulty, recovered $\frac{5}{8}$ of it in equal shares again, but the other three carried off $\frac{1}{8}$ apiece of the same. Upon this, they called a truce, and agreed that the $\frac{1}{3}$ of the whole, left by A at first, should be equally divided among them. How much of the prize, after this distribution, remained with each of the competitors?

I. Solution by A. L. FOOTE, C. E., Middleburg, Connecticut.

First, A has $\frac{2}{3}$; second, A has $\frac{2}{3}-(\frac{3}{8}+\frac{3}{10})$ of $\frac{2}{3}=\frac{13}{60}$, B has $\frac{3}{8}$ of $\frac{2}{3}=\frac{1}{4}$, and C has $\frac{3}{10}$ of $\frac{2}{3}=\frac{1}{5}$; third, A has $\frac{13}{60}-(\frac{13}{70}+\frac{13}{420})=0$, B has $\frac{1}{4}$, C, $\frac{1}{5}$, D $\frac{6}{7}$ of $\frac{13}{60}=\frac{13}{70}$, and E, $\frac{1}{7}$ of $\frac{13}{60}=\frac{13}{420}$; fourth, A has 0, B has $\frac{1}{2}$ of $\frac{1}{4}=\frac{1}{8}$, C has $\frac{1}{5}$, D has $\frac{13}{70}+\frac{1}{16}=\frac{139}{560}$, and E has $\frac{13}{420}+\frac{1}{16}=\frac{157}{1680}$; fifth, A has $\frac{1}{4}$ of $\frac{1}{5}=\frac{1}{20}$, B has $\frac{1}{8}+(\frac{1}{3}$ of $\frac{1}{5})=\frac{23}{120}$, C has $\frac{1}{5}-(\frac{1}{20}+\frac{1}{15}+\frac{2}{35})=\frac{11}{420}$, D has $\frac{139}{560}+(\frac{2}{7}$ of $\frac{1}{5})=\frac{171}{560}$, and E has $\frac{157}{1680}$; sixth, A has $\frac{1}{20}-(\frac{3}{4}$ of $\frac{1}{20})=\frac{1}{80}$, B has $\frac{23}{120}-(\frac{3}{4}$ of $\frac{1}{15})=\frac{17}{120}$, C has $\frac{11}{420}$, D has $\frac{171}{560}+\frac{7}{80}=\frac{11}{28}$, and E has $\frac{157}{1680}$; seventh, A has $\frac{1}{80}+\frac{7}{256}=\frac{51}{1280}$, B has

$\frac{17}{120}+\frac{7}{256}=\frac{649}{3840}$, C has $\frac{11}{420}$, D has $\frac{11}{28}-\frac{7}{128}=\frac{303}{896}$, and E has $\frac{157}{1680}$; eight, A has $\frac{51}{1280}-\frac{21}{2048}+\frac{1}{15}=\frac{2957}{30720}$, B has $\frac{649}{3840}-\frac{21}{2048}+\frac{1}{15}=\frac{6925}{30720}$, C has $\frac{11}{420}+\frac{7}{1024}+\frac{1}{15}=\frac{10719}{107520}$, D has $\frac{303}{896}+\frac{7}{1024}+\frac{1}{15}=\frac{44263}{107520}$, and E has $\frac{157}{1680}+\frac{7}{1024}+\frac{1}{15}=\frac{17951}{107520}$, or reducing these fractions to a common denominator, we have the following: A $\frac{20699}{215040}$, B $\frac{48475}{215040}$, C $\frac{21438}{215040}$, D $\frac{88526}{215040}$, E $\frac{35902}{215040}$, the sum of which is $\frac{215050}{215040}=1$ as it should be.

Excellent solutions of this problem were received from *G. B. M. Zerr*, *E. W. Morrell*, and *P. S. Berg*

ERRATUM—In the solution of problem 42, Professor Cooper D. Schmitt's address should read, Professor of Mathematics, University of Tenn. etc.

PROBLEMS.

48. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

Fifty thousand days preceding Thursday, March 7, 1895, was what date and what day of the week?

49. Proposed by J. A. CALDERHEAD, B. Sc., Superintendent of Schools, Limaville, Ohio.

I have a garden in the form of an equilateral triangle, whose sides are 200 feet. At each corner stands a tower; the height of the first is 30 feet, the second is 40 feet, and the third is 50 feet. At what distance from the base of each tower must a ladder be placed, that it may just reach the top of each? And what is the length of the ladder, the garden being a horizontal plane?

[From *Greenleaf's National Arithmetic.*]

Give a solution simple enough to be presented to a class in arithmetic.

ALGEBRA.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

39. Proposed by ARTEMAS MARTIN, LL. D., U. S. Coast aud Geodetic Survey Office, Washington, D. C.

Find x, y, z, and w from the equations

$$x^4+y^4+z^4+x^2+y^2+z^2=112\ldots.(1),$$
$$x^4+z^4+w^4+x^2+z^2+w^2=382\ldots.(2),$$
$$x^4+y^4+w^4+x^2+y^2+w^2=294\ldots.(3),$$
$$y^4+z^4+w^4+y^2+z^2+w^2=364\ldots.(4).$$

I. Solution by A. H. BELL, Hillsboro, Illinois, P. S. BERG, Apple Creek, Ohio, D. G. DURRANCE, Jr., Camden. N.Y., COOPER D. SCHMITT, A.M., University of Tennessee, and H.C.WILKES, Murraysville, West Virginia.